City and County of Honolulu

JOHNSON CONTROLS

Honolulu Hale

Energy Conservation Project

February 26, 2003

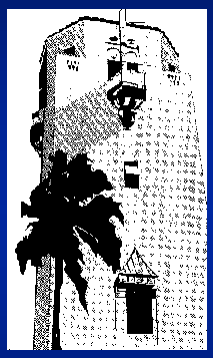
Facility Challenges

- Support of critical public service activities
- Aging physical plant equipment (25 yrs)
- Energy & operational inefficiencies
- Comfort & productivity issues
- Deferred maintenance
- Regulatory requirements
- Risk management
- Required system uptime

Honolulu Hale

530 South King Street Honolulu, Hawaii 96813

City & County of Honolulu's City Hall



Financial: $ 3.1 M Cost $ 125,000/yr. Savings

ECMS: High-Efficiency Centrifugal Chillers

220 kW Cogeneration System with 70 ton Absorption Chiller.

Induced Draft Cooling Tower

Primary/Secondary Chilled Water Loop with Variable-Speed pumping

T8, Elec. Ballasts, Compact Fluorescent lamps LED Exit signs, Occupancy sensors.

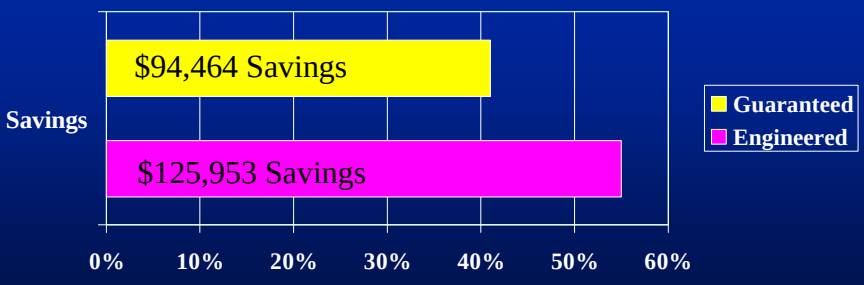
2-way Chilled Water Valve Change & Digital Temperature Control Retrofit.

Energy Management System

Electrical Cable Replacement

Proposed Energy Expenditure Savings

- **Energy Cost Reduction -** Guaranteed Annual Utility Cost Reduction of **41%**
- **Meet C&C of Honolulu Goals -** Significant Step towards Energy Reduction & Operational Flexibility Goals



Energy Conservation Measures

ECMs

- **ECM 1.1: Lighting Retrofit - Office Areas**
- **ECM 1.2: Lighting Retrofit/ Replacement - Public Areas**
- **ECM 2.1: Chiller Plant Replacement**
- **ECM 3.1: Energy Management System / AHU Valves and DDC Controllers**
- **ECM 4.1: Cogeneration System**

ECM 1.1 & 1.2 Lighting Retrofits

- **Office Lighting**
- **Architectural Lighting**

- T-8 Lamps w/Electronic Ballasts, Compact Fluorescent Lamps LED Exit Signs Occupancy Sensors
- Install Correct Period Fixtures
- Improve Lighting levels and Quality for Improved Work Environment
- Reduce Lighting Maintenance Costs

ECM 2.1 Central Plant Replacement

- **Chillers & Cooling Tower**
- **Pumping Systems**

- Replace Failing Equipment and meet Cooling Requirements
- Increase Operational Flexibility
- High-Efficiency Chillers
- Induced Draft Cooling Tower
- Primary/Secondary Pumping
- New Electrical Cables to meet Building Code requirements

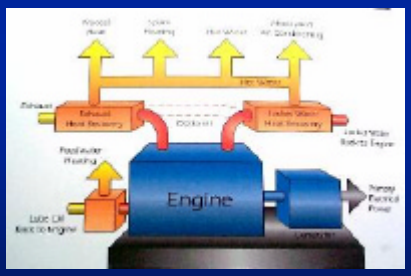
ECM 3.1 New AHU Valves & DDC Control

- **New Energy Management System**
- **Digital Temperature Control**

- Replace Failing Equipment and Improve Temperature Control for Productivity and Comfort Requirements
- Increase Operational Flexibility & Scheduling Abilities
- Quicker response to Hot & Cold Calls
- New AHU Control Valves
- Digital Controllers tied to Energy Management Control System Network

ECM 4.1 Cogeneration System

- **220kW Cogenerator**
- **55 ton Absorption Chiller**



• Increase Operational Flexibility with flexible Cooling Capacity and Fuel Selection Choice

• Reduced Operational Costs

•Increase ability to operate facility during power outages

• Reduce "On-Peak" Electrical Demand to help defer future power plant & power line construction

Estimated Utility Rebates

- **HECO Energy Solutions for Business Program**
- **Schedule Meeting with HECO to Discuss Refining Rebate Levels**
- **Estimated Rebates**

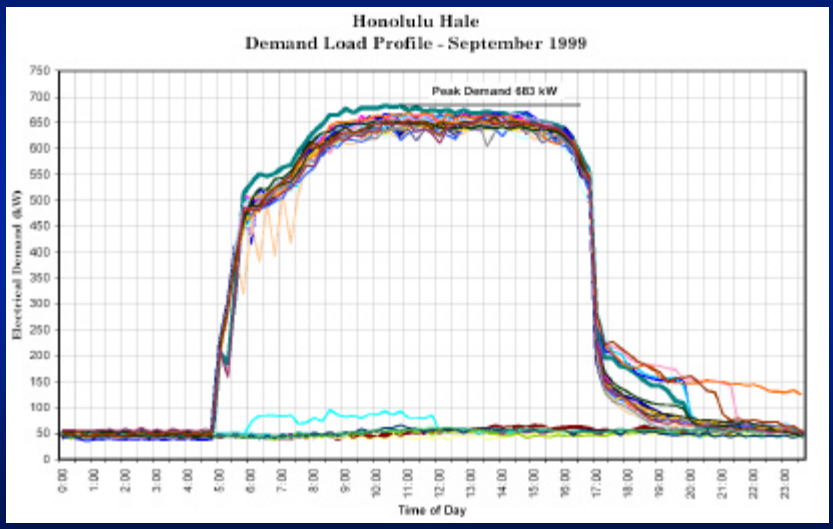
• Funding Approved through 2000.
• Applied for a five year extension.

• Discussion about rebates
(Custom versus Prescriptive)
• Submit Applications

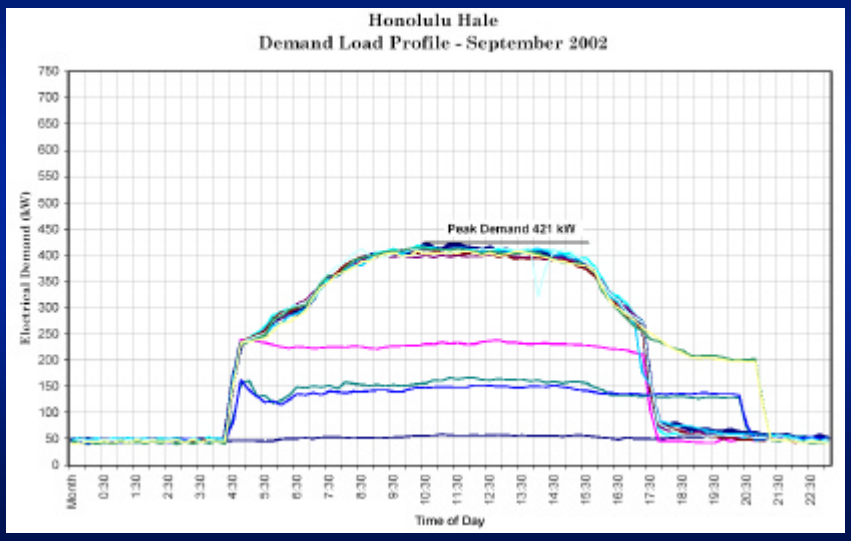
Prescriptive
- • Lighting = $14,112
- • Motors = $802
- • Chillers = $18,750

Custom
- • Study = $10,000
- • Lighting/HVAC = $20,872

Electrical Load Profile - Sept. 99



Electrical Load Profile - Sept. 02



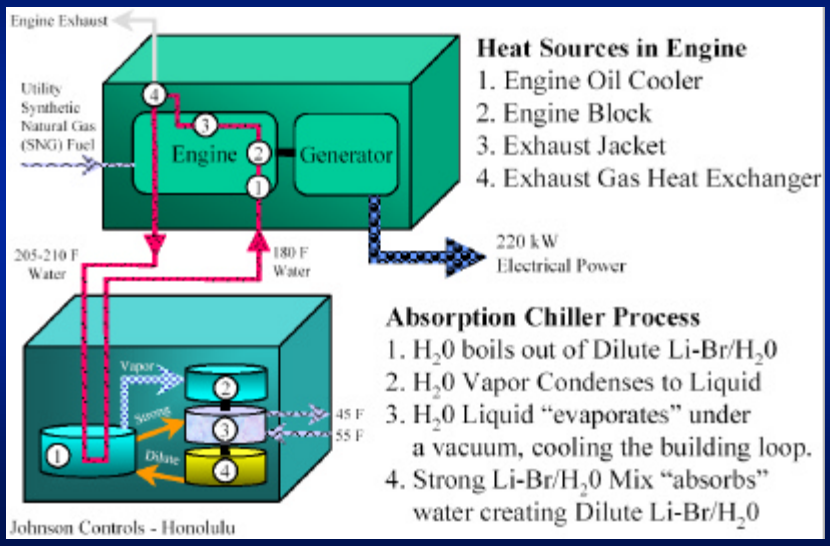
Hallway Lighting Before & After

Old & New Chillers

220 kW Cogeneration Unit

55 ton Absorption Chiller

Cogeneration Schematic



Heat Sources in Engine

1. Engine Oil Cooler
2. Engine Block
3. Exhaust Jacket
4. Exhaust Gas Heat Exchanger

Absorption Chiller Process

1. H_20 boils out of Dilute Li-Br/H_20
2. H_20 Vapor Condenses to Liquid
3. H_20 Liquid "evaporates" under a vacuum, cooling the building loop.
4. Strong Li-Br/H_20 Mix "absorbs" water creating Dilute Li-Br/H_20

Courtyard Before & After

Mahalo

Are there any Questions?

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